Variability of pesticide residues in eggplant units collected from a field trial, and market places in Greece

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Variability of pesticide residues among food items is very important for consumer food safety evaluation and risk assessment. To estimate the variability of pesticide residue levels present in eggplant units, a total of 120 samples were collected from a trial field of a cooperating farmer, and 142 samples were collected from different market places in Thessaloniki, Greece. The collected samples were extracted using the quick, easy, cheap, effective, rugged, and safe (QuEChERS) extraction technique and the residues were determined by liquid chromatography coupled with triple quadrupole mass spectrometry (LC-MS/MS). The developed method was validated by evaluating the accuracy, precision, linearity, limit of detection (LOD) and limit of quantification (LOQ). The average recoveries for all the analytes, derived from data of control samples fortified at 0.01, 0.05, 0.1 & 0.5 mg/Kg, ranged from 84% to 112% with relative standard deviation (RSDr) ≤16%. The correlation coefficient (R2) was ≥0.997 for all the analytes using matrix matched calibration standards. The LOD values ranged from 0.001 to 0.003 mg/kg, and the LOQ was determined at 0.01 mg/kg for all the sought analytes. The matrix effect was evaluated, and it was found to be at a considerable level, especially for thiamethoxam, cypermethrin and deltamethrin and it was -69%, +57% and +93%, respectively. The unit to unit variability factors (VFs) obtained for cypermethrin and deltamethrin residues were 2.54 and 2.51 respectively, for the field samples while the average VFs, derived from the data of the marketed samples, was 3.89. In the marketed samples, residues of cypermethrin, deltamethrin, chlorpyrifos, chlorpyrifos-methyl, thiamethoxam, thiacloprid, acetamiprid, azoxystrobin, dimethoate and propamocarb hydrochloride were found at levels ≥ LOQ value and their respective VFs ranged from 1.00 to 7.09. In this study, within plant of eggplant unit to unit residue variation was also performed. The results revealed that exposed units of eggplant (fruits collected from the outer part) had higher residues for both pesticides compared to the non exposed units of eggplant (fruits collected from the inner part). Moreover, comparison between the estimated residue levels found from the individual units and the composite samples were also investigated and it was found that the mean residue levels of both pesticides were higher than the respective means of residue levels estimated from the individual samples. However, the variation of residue levels estimated from the composite samples was much lower than the variation of residue levels estimated from the individual samples.